US009471219B2

(12) **United States Patent**
Jang et al.

(10) **Patent No.: US 9,471,219 B2**
(45) **Date of Patent: Oct. 18, 2016**

(54) **TEXT RECOGNITION APPARATUS AND METHOD FOR A TERMINAL**

(71) Applicant: **Samsung Electronics Co., Ltd.**, Gyeonggi-do (KR)

(72) Inventors: **Sihak Jang**, Gyeonggi-do (KR); **Seonhwa Kim**, Seoul (KR); **HeeJin Kim**, Seoul (KR); **Mijung Park**, Gyeonggi-do (KR)

(73) Assignee: **Samsung Electronics Co., Ltd.**, Yeongtong-gu, Suwon-si, Gyeonggi-do (KR)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 100 days.

(21) Appl. No.: **13/972,324**

(22) Filed: **Aug. 21, 2013**

(65) **Prior Publication Data**

US 2014/0062962 A1 Mar. 6, 2014

(30) **Foreign Application Priority Data**

Aug. 28, 2012 (KR) 10-2012-0094029

(51) **Int. Cl.**

G06F 3/0488	(2013.01)
G06K 9/20	(2006.01)
G06F 3/0354	(2013.01)
G06F 17/21	(2006.01)

(52) **U.S. Cl.**

CPC ***G06F 3/04883*** (2013.01); ***G06F 3/03545*** (2013.01); ***G06F 17/21*** (2013.01); ***G06K 9/2081*** (2013.01); *G06F 2203/04807* (2013.01); *G06K 2209/01* (2013.01)

(58) **Field of Classification Search**

None

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2003/0120478	A1	6/2003	Palmquist	
2003/0185448	A1*	10/2003	Seeger et al.	382/229
2006/0142054	A1	6/2006	Wang et al.	
2007/0300142	A1*	12/2007	King et al.	715/500
2008/0118162	A1*	5/2008	Siegemund	382/229
2011/0066421	A1*	3/2011	Lee et al.	704/2
2011/0081083	A1*	4/2011	Lee et al.	382/182
2011/0081948	A1*	4/2011	Shirai	G06T 11/60 455/556.2
2011/0123115	A1	5/2011	Lee et al.	
2011/0249900	A1*	10/2011	Thorn et al.	382/195
2012/0131520	A1	5/2012	Tang et al.	

OTHER PUBLICATIONS

Xiamen Scan Technology: ScanDic—Camera Translator for Android Phones, Mar. 18, 2011, XP054975655, Retrieved from the Internet: https://www.youtube.com/watch?v=lglXbo_XRd0.

IntSig: CamDictionary, Aug. 25, 2011, XP055159464, Retrieved from the Internet: https://play.google.com/store/apps/details?id=com.intsig.license.camdict.

Inaba5817 Channel: Cam Dictionary, Dec. 17, 2011, XP054975656, Retrieved from the Internet: https://www.youtube.com/watch?v=j0E0cXqePB0.

* cited by examiner

Primary Examiner — Vu Le
Assistant Examiner — Alexander J Lesnick
(74) *Attorney, Agent, or Firm* — Cha & Reiter, LLC

(57) **ABSTRACT**

A text recognition apparatus and method of the portable terminal is provided for recognizing text image selected by a pen on a screen image as text. The text recognition method of the present invention includes displaying an image; configuring a recognition area on the image in response to a gesture made with a pen; recognizing text in the recognition area; displaying the recognized text and action items corresponding to the text; and executing, when one of the action items is selected, an action corresponding to the selected action item.

11 Claims, 11 Drawing Sheets

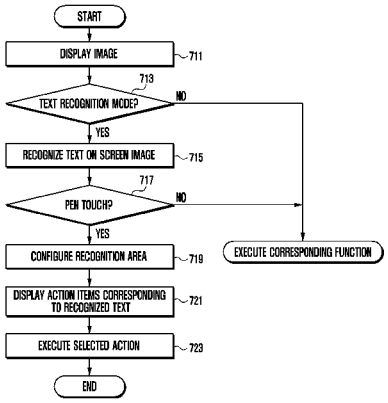


FIG. 1

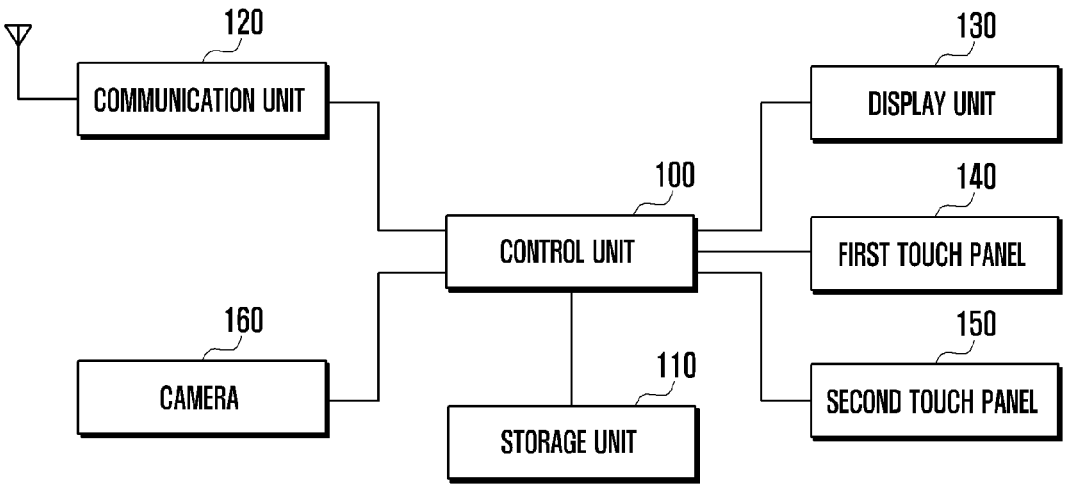

120
COMMUNICATION UNIT
130
DISPLAY UNIT
100
CONTROL UNIT
140
FIRST TOUCH PANEL
160
CAMERA
110
STORAGE UNIT
150
SECOND TOUCH PANEL

FIG. 2

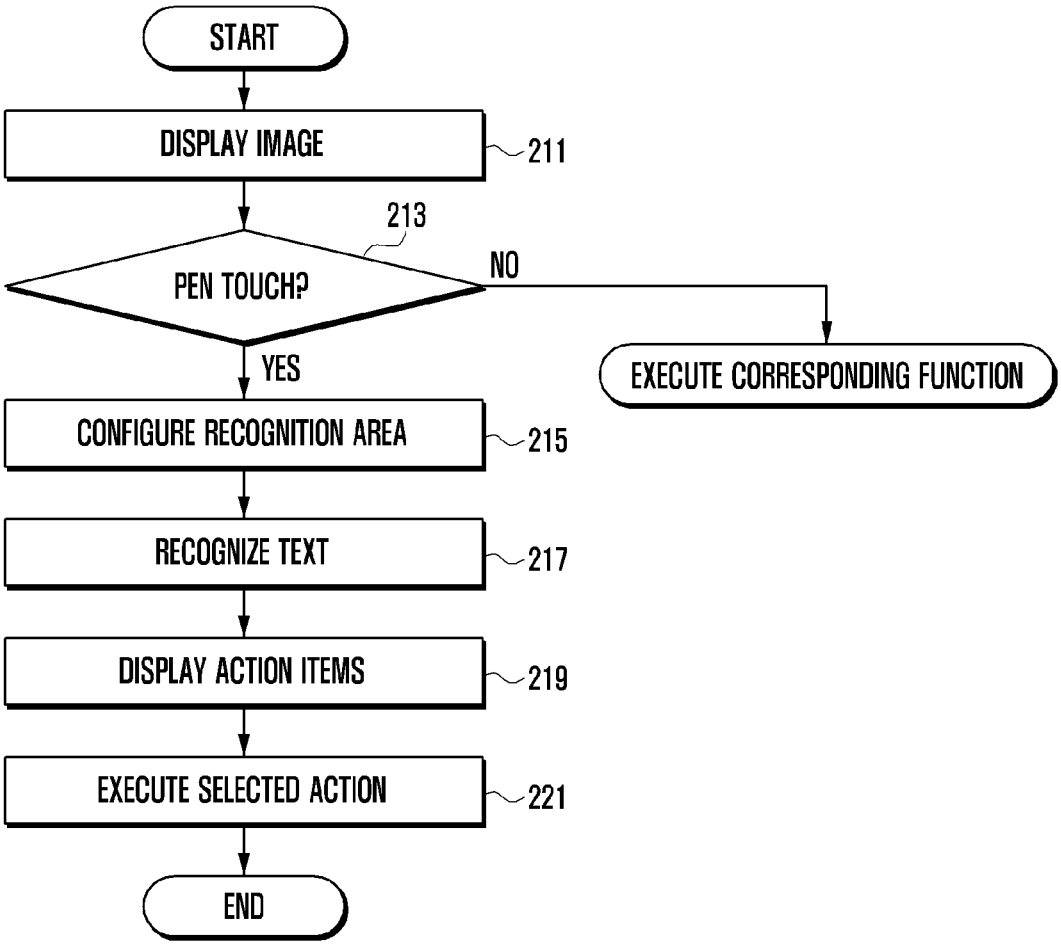

START
DISPLAY IMAGE
211
213
PEN TOUCH?
NO
EXECUTE CORRESPONDING FUNCTION
YES
CONFIGURE RECOGNITION AREA
215
RECOGNIZE TEXT
217
DISPLAY ACTION ITEMS
219
EXECUTE SELECTED ACTION
221
END

FIG. 3

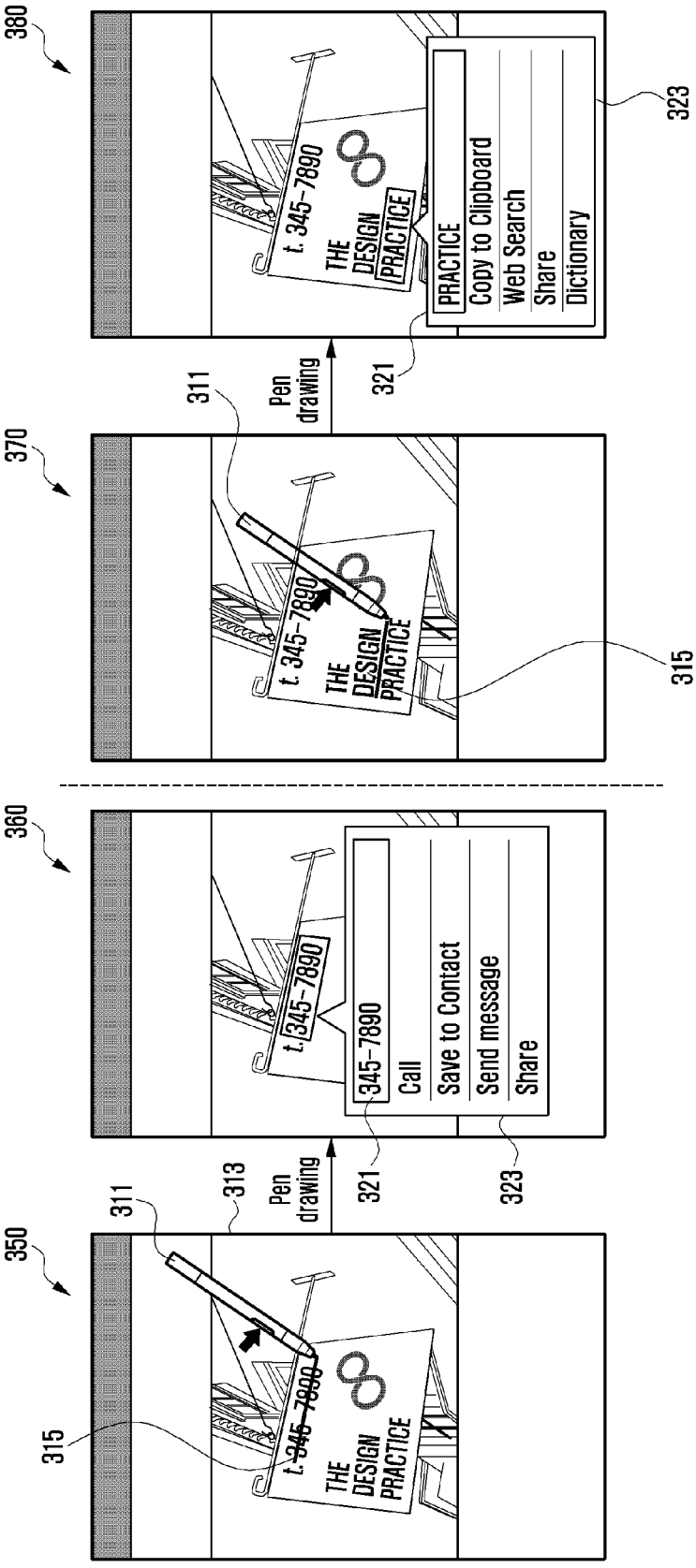

380
370
360
350
311
313
315
321
323
Pen drawing
t. 345-7890
THE DESIGN PRACTICE
PRACTICE
Copy to Clipboard
Web Search
Share
Dictionary
345-7890
Call
Save to Contact
Send message
Share

FIG. 4A

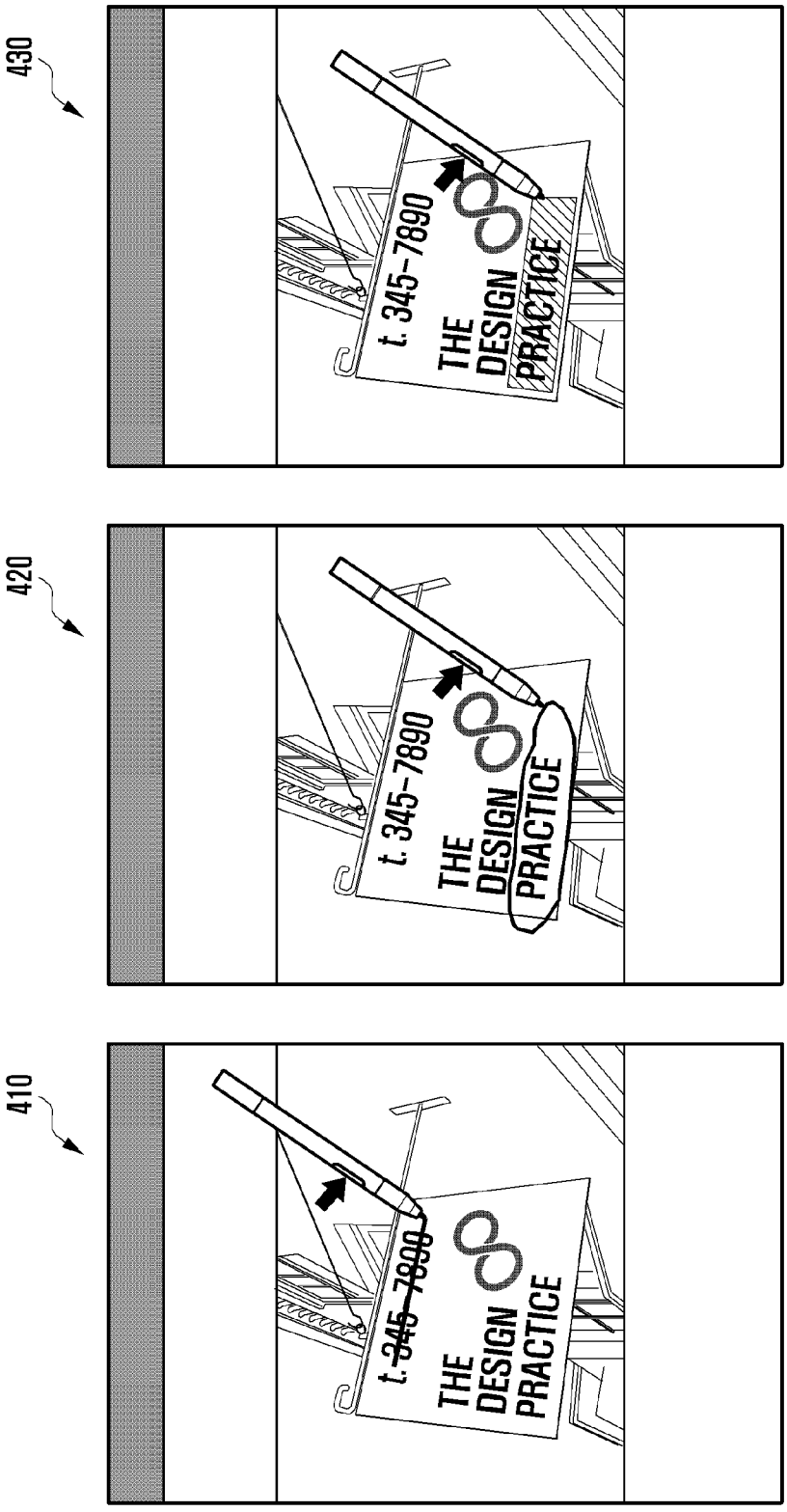

430
t. 345-7890
THE DESIGN PRACTICE
420
t. 345-7890
THE DESIGN PRACTICE
410
t. 345-7890
THE DESIGN PRACTICE

FIG. 4B

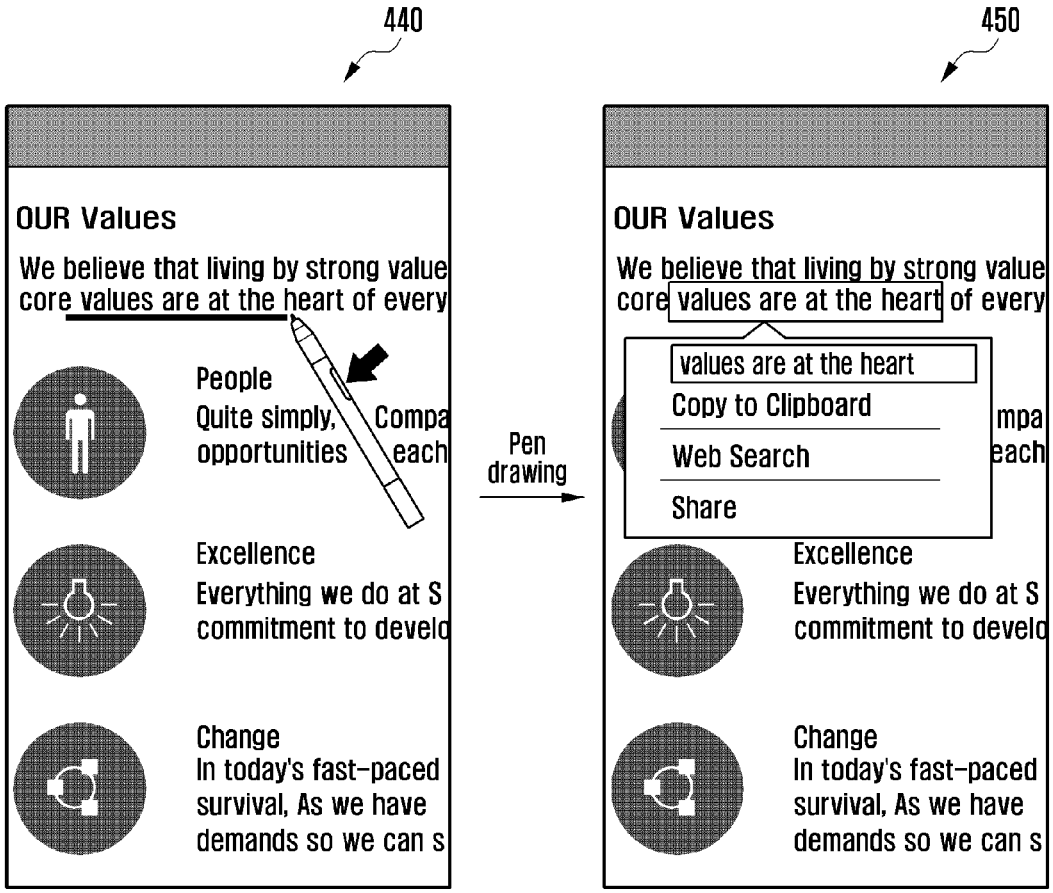

440
450
OUR Values
We believe that living by strong value
core values are at the heart of every
People
Quite simply,
opportunities
Compa
each
Excellence
Everything we do at S
commitment to develo
Change
In today's fast-paced
survival, As we have
demands so we can s
Pen
drawing
OUR Values
We believe that living by strong value
core values are at the heart of every
values are at the heart
Copy to Clipboard
Web Search
Share
mpa
each
Excellence
Everything we do at S
commitment to develo
Change
In today's fast-paced
survival, As we have
demands so we can s

FIG. 5

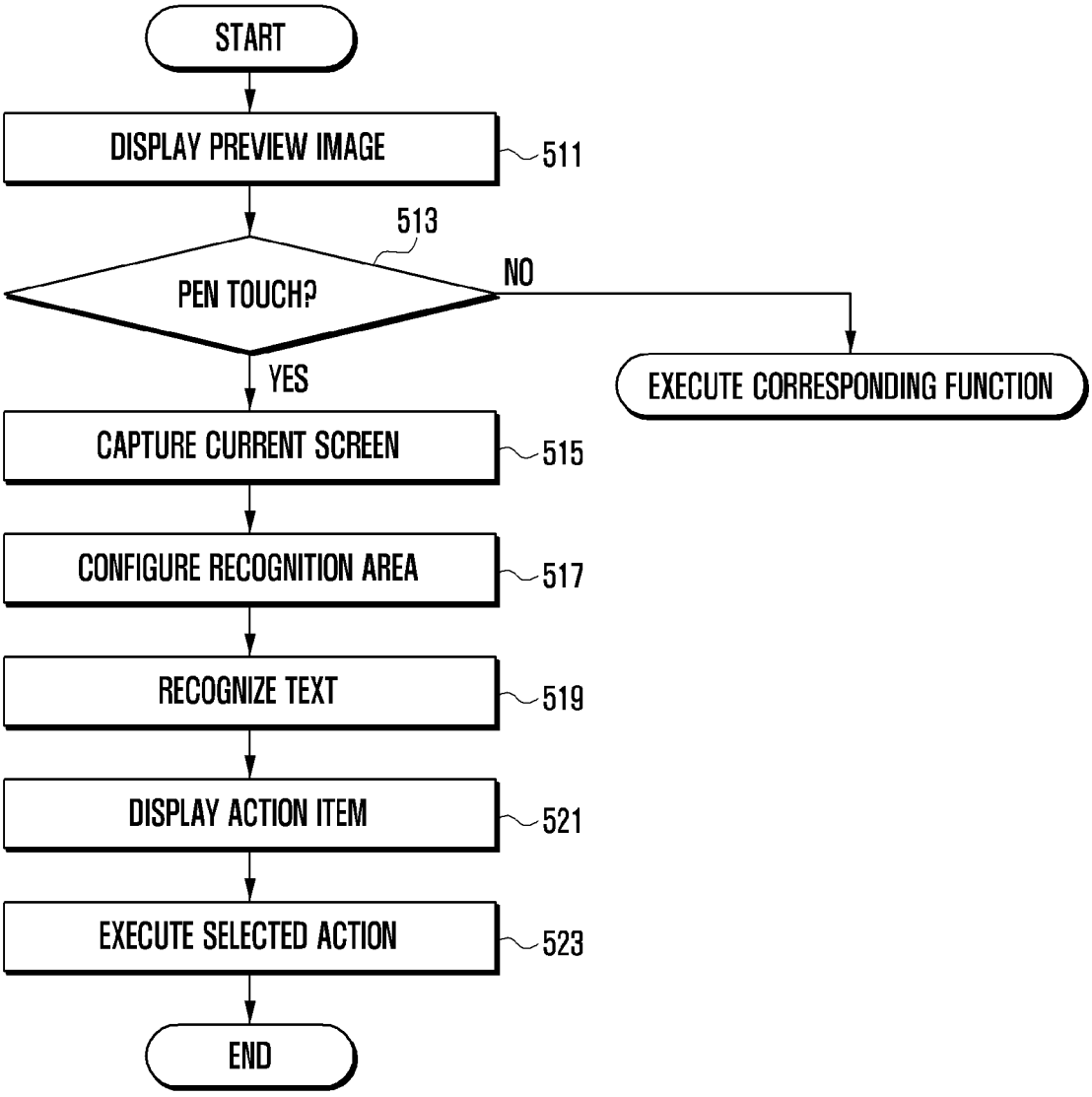

START
DISPLAY PREVIEW IMAGE
511
513
PEN TOUCH?
NO
EXECUTE CORRESPONDING FUNCTION
YES
CAPTURE CURRENT SCREEN
515
CONFIGURE RECOGNITION AREA
517
RECOGNIZE TEXT
519
DISPLAY ACTION ITEM
521
EXECUTE SELECTED ACTION
523
END

FIG. 6A

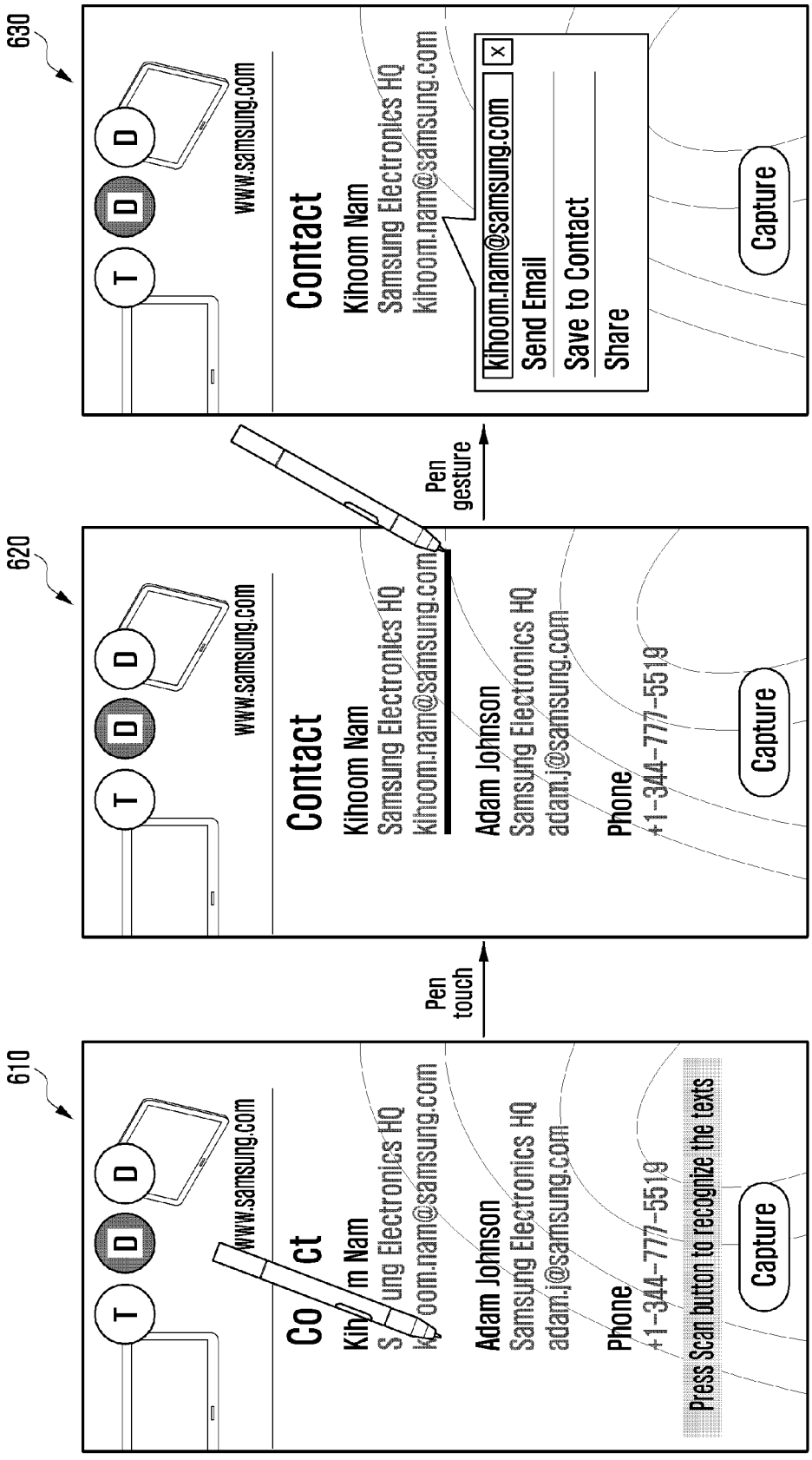

610
620
630
www.samsung.com
Contact
Kihoom Nam
Samsung Electronics HQ
kihoom.nam@samsung.com
Adam Johnson
Samsung Electronics HQ
adam.j@samsung.com
Phone
+1-344-777-5519
Capture
Press Scan button to recognize the texts
Pen touch
Pen gesture
Send Email
Save to Contact
Share

FIG. 6B

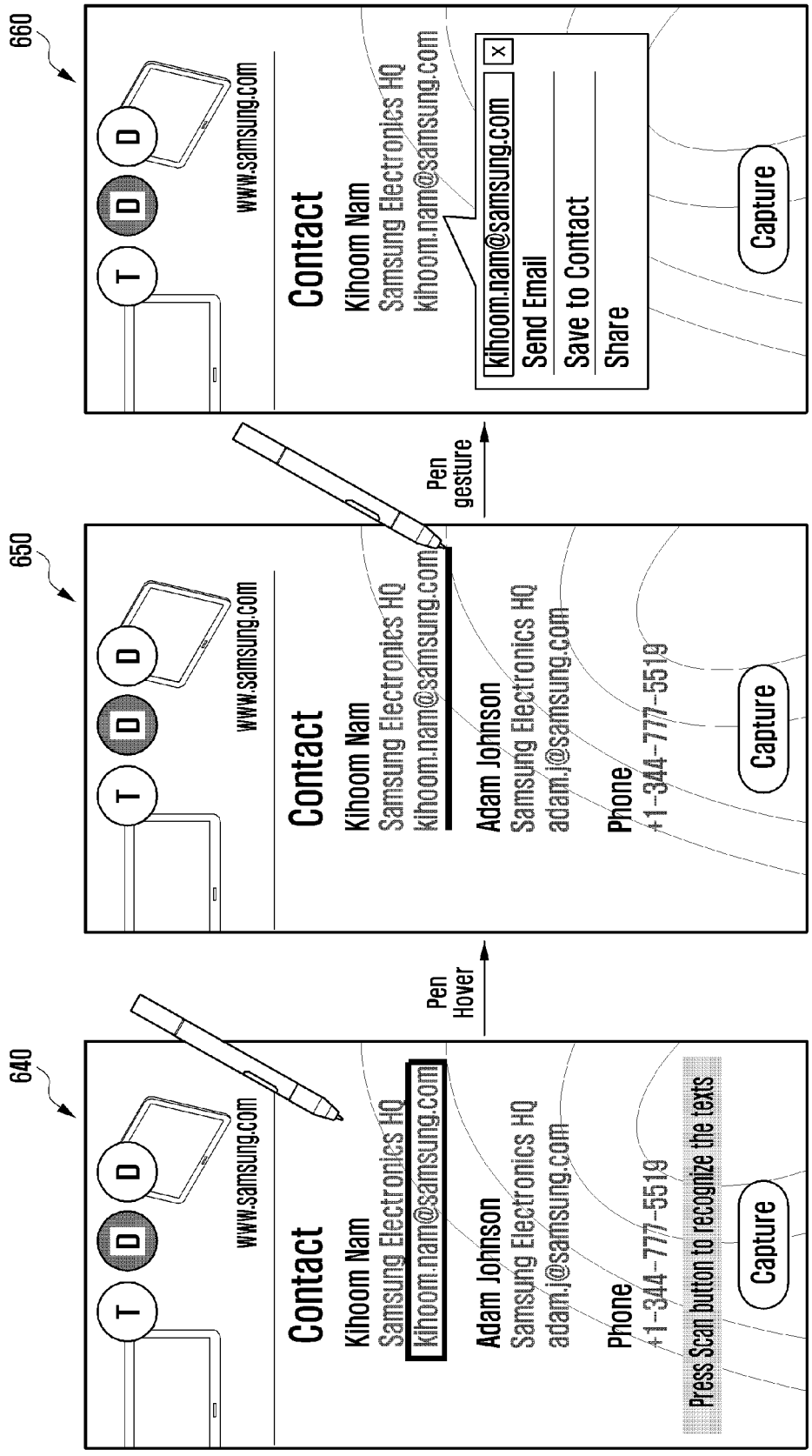

640
650
660
www.samsung.com
Contact
Kihoom Nam
Samsung Electronics HQ
kihoom.nam@samsung.com
Adam Johnson
Samsung Electronics HQ
adam.j@samsung.com
Phone
+1-344-777-5519
Capture
Press Scan button to recognize the texts
Pen Hover
Pen gesture
Send Email
Save to Contact
Share

FIG. 7

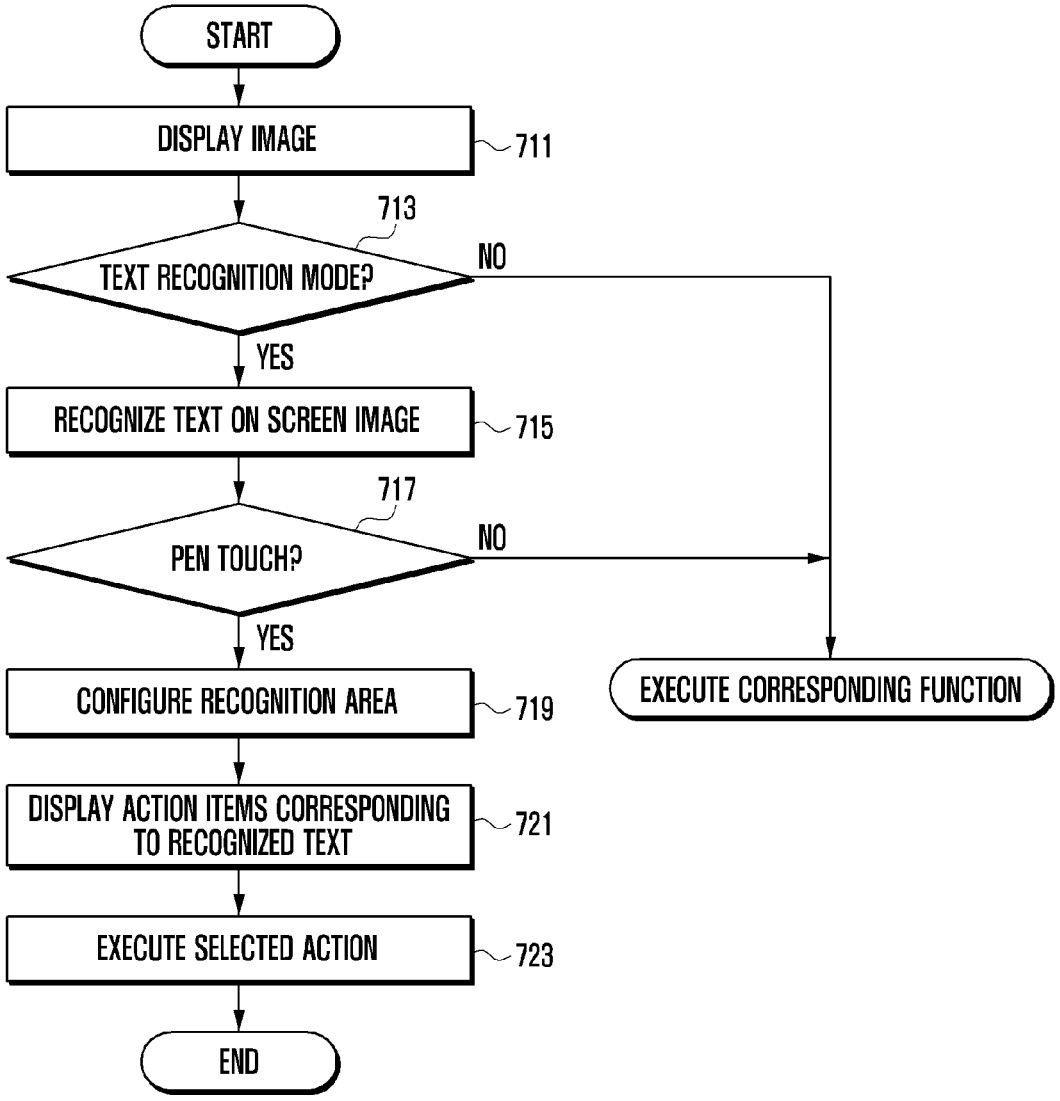

START
DISPLAY IMAGE
711
713
TEXT RECOGNITION MODE?
NO
YES
RECOGNIZE TEXT ON SCREEN IMAGE
715
717
PEN TOUCH?
NO
YES
CONFIGURE RECOGNITION AREA
719
EXECUTE CORRESPONDING FUNCTION
DISPLAY ACTION ITEMS CORRESPONDING TO RECOGNIZED TEXT
721
EXECUTE SELECTED ACTION
723
END

FIG. 8A

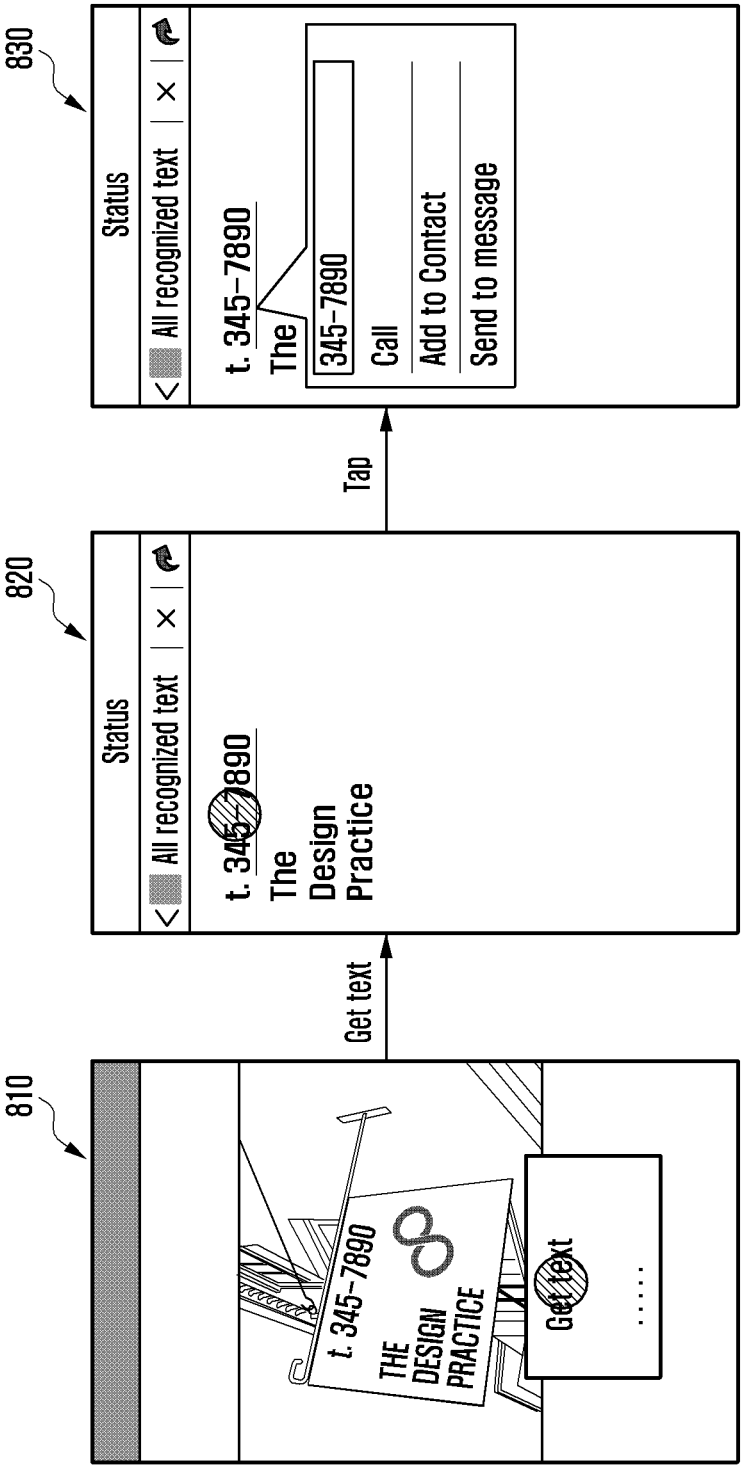
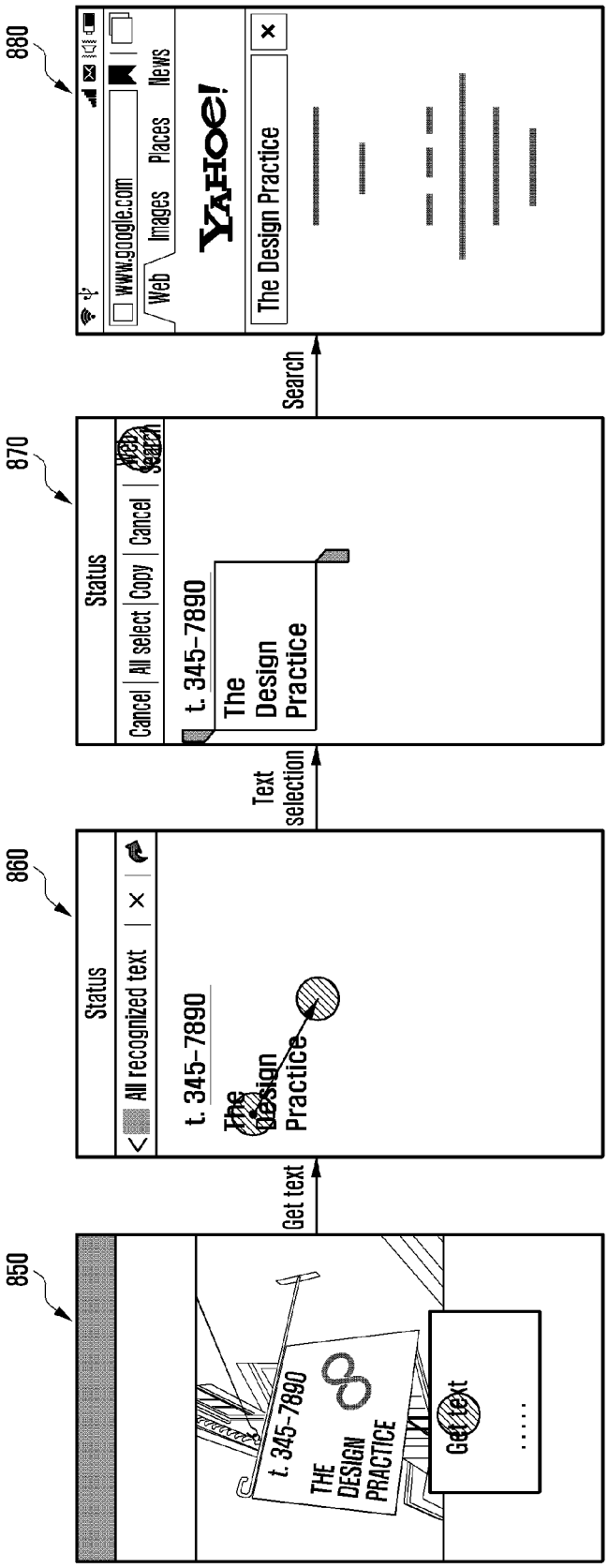

810
t. 345-7890
THE
DESIGN
PRACTICE
Get text
.....
Get text
820
Status
All recognized text
t. 345-7890
The
Design
Practice
Tap
830
Status
All recognized text
t. 345-7890
The
345-7890
Call
Add to Contact
Send to message

FIG. 8B


850
Get text
860
Status
All recognized text
t. 345-7890
The Design Practice
Text selection
870
Status
Cancel
All select
Copy
Cancel
Search
t. 345-7890
The Design Practice
Search
880
www.google.com
Web
Images
Places
News
YAHOO!
The Design Practice
t. 345-7890
THE DESIGN PRACTICE
Get text

TEXT RECOGNITION APPARATUS AND METHOD FOR A TERMINAL

CLAIM OF PRIORITY

This application claims the benefit under 35 U.S.C. §119 (a) of a Korean patent application filed on Aug. 28, 2012 in the Korean Intellectual Property Office and assigned Serial No. 10-2012-0094029, the entire disclosure of which is hereby incorporated by reference.

BACKGROUND

1. Field of the Invention

The present disclosure relates to a portable terminal and, in particular, to a text recognition apparatus and method for recognizing text displayed on a screen image using a touch pen.

2. Description of the Related Art

A portable terminal is typically equipped with a touch panel that the user can control through simple or multi-touch gestures and a camera for capturing an image. Many recent portable terminals are now provided with include text and speech recognition functions to increase user's experience.

A touch panel senses an input using a finger or a touch pen. The former type touch panel can be implemented as a capacitive touch panel, and the latter type touch panel as an electro-magnetic resonance (EMR) touch panel. The touch pen can be implemented as a capacitive type touch pen as well as an EMR type touch pen. In the case of using the capacitive type touch pen, the capacitive touch panel is capable of sensing the touch inputs made by both the human body (e.g. finger) and the capacitive type touch pen.

Recently, there is a demand for recognizing the text in an image taken by the camera in real time. That is, there is a need of a method for recognizing the text included in a preview image captured by the camera and taking an action according to the recognition outcome.

SUMMARY

The present invention provides a text recognition apparatus and method for use in a portable terminal equipped with a camera and a touch panel capable of locating the position of at least one text designated by a touch pen on an image (preview image, still image, etc.) and recognizing a character image at the position selected by the contact during a text recognition mode.

Another aspect of the invention provides a text recognition apparatus and method for use in a portable terminal where at least one text contact made by a touch pen or pointed by hovering gesture thereon for initiating a character recognition during a text recognition mode.

Another aspect of the invention provides capturing of a preview image as a still image in response to a pen touch or pen hovering gesture without the contact, so that the text recognized using the pen action is displayed along with a list of executable items corresponding to the recognized text for selection.

In accordance with an aspect of the present invention, a text recognition method of a terminal includes displaying an image; configuring or defining a recognition area on the image in response to an input gesture using an object; recognizing at least one text in the recognition area; and displaying the recognized text and a list of selectable action items corresponding to the text for selection.

In accordance with another aspect of the present invention, a text recognition apparatus of a terminal includes a camera providing an image; a touch panel detecting an input gesture made using an object; a display unit displaying the captured image; and a control unit controlling the display unit for configuring or defining a recognition area on the image in response to the input gesture, recognizing at least one text in the recognition area, and displaying the recognized text and a list of selectable action items corresponding to the text.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a block diagram illustrating the configuration of the terminal according to an embodiment of the present invention;

FIG. **2** is a flowchart illustrating the process of recognizing and processing text in an image displayed on the screen of the terminal according to an embodiment of the present invention;

FIG. **3** is a diagram illustrating exemplary screen images displayed by the terminal operating in the text recognition mode according to an embodiment of the present invention;

FIGS. **4***a* and **4***b* are diagrams illustrating exemplary screen images for explaining configuration of the recognition area in response to the pen gesture input in the text recognition method according to an embodiment of the present invention;

FIG. **5** is a flowchart illustrating the pen touch-based text recognition method for a terminal operating in the preview mode according to an embodiment of the present invention;

FIGS. **6***a* and **6***b* are diagrams illustrating exemplary screen images for explaining the text recognition procedure of FIG. **5**;

FIG. **7** is a flowchart illustrating the text recognition method according to an embodiment of the present invention; and

FIGS. **8***a* and **8***b* are the diagrams illustrating exemplary screen images for explaining the text recognition procedure of FIG. **7**.

DETAILED DESCRIPTION

Exemplary embodiments of the present invention are described with reference to the accompanying drawings in detail. The same reference numbers are used throughout the drawings to refer to the same or like parts.

The terms and words used in the following description and claims are not limited to the bibliographical meanings, but, are merely used by the inventor to enable a clear and consistent understanding of the invention. Accordingly, it should be apparent to those skilled in the art that the following description of exemplary embodiments of the present invention is provided for illustration purpose only and not for the purpose of limiting the invention as defined by the appended claims and their equivalents.

It is to be understood that the singular forms "a," "an," and "the" include plural referents unless the context clearly dictates otherwise. Thus, for example, reference to "a component surface" includes reference to one or more of such surfaces.

By the term "substantially" it is meant that the recited characteristic, parameter, or value need not be achieved exactly, but that deviations or variations, including for example, tolerances, measurement error, measurement accuracy limitations and other factors known to those of skill in

the art, may occur in amounts that do not preclude the effect the characteristic was intended to provide.

In an embodiment of the present invention, the terminal equipped with a camera and a pen touch-sensitive touch panel is capable of selecting the position contacted by a touch pen on an image (preview image, still image, etc.) and recognizing text image at the selected position. To achieve this, the terminal includes a touch panel sensitive to a pen touch that is capable of sensing the touch or hovering gesture made on or above the touch panel with or without contact thereon.

In an embodiment of the present invention, the terminal operating in a preview mode is capable of capturing a preview image as a still image in response to a pen touch gesture. If a pen touch gesture or hovering gesture over the touch panel is detected, the terminal analyzes the image at the position where the pen touch or hovering gesture is detected and recognizes the character according to the analysis result and then display a list of items executable corresponding to the recognized character. According to an embodiment of the present invention, if a pen touch gesture is detected in the state of displaying the preview image captured by the camera, the terminal recognizes the text image at the position of the pen touch, displays the recognized character data and at least one action item corresponding to the recognized character data, and executing, if the user selects an action item, the function corresponding to the selected action item.

According to an embodiment of the present invention, if a pen touch gesture is detected in the state of displaying a still image, the terminal recognizes text image near where the pen touch is detected, displays the recognized character data and at least one action item corresponding to the character data, and executes, if the user selects an action item, the function corresponding to the selected action item.

FIG. **1** is a block diagram illustrating the configuration of the terminal according to an embodiment of the present invention. Here, the terminal can be any of various digital devices such as a mobile terminal including smartphone, MP3 player, tablet PC, and desktop/laptop PC.

Referring to FIG. **1**, the communication unit **120** is responsible of radio communication with a base station or another terminal. Here, the communication unit **120** may include a transmitter for up-converting and amplifying the signal to be transmitted and a receiver for low noise amplifying and down converting the received signal. The communication unit **120** may include a modulator and demodulator. The modulator modulates the transmission signal which is transferred to the transmitter, and the demodulator demodulates the signal received by the receiver. The modulator/demodulator can be any of LTE, WCDMA, GSM, Wi-Fi, WiBro, NFC, Bluetooth modulators/demodulators. In an embodiment of the present invention, the description is made under the assumption that the communication unit **120** includes the LTE, Wi-Fi, and Bluetooth communication modules.

The camera **160** is responsible for taking an image in response to a camera driving command.

The control unit **100** controls overall operations of the terminal and, in the text recognition mode, recognizes the character at the focused position of a preview image provided by the camera **160** and the character included in the screen image captured in response to a capture request. In the text recognition mode, the control unit **100** checks the function configured in the text recognition mode, displays the action item corresponding to the recognized character in association with the function, and controls execution of the action corresponding to the item selected by the user.

The memory **110** includes a program memory for storing Operation System (OS) of the terminal and application programs associated with the method according to an embodiment of the present invention a data memory for storing tables associated with the operations of the terminal and data by the programs.

The display unit **130** displays information on the application running currently under the control of the control unit **100**. The display unit **130** can be implemented with one of Liquid Crystal Display (LCD) and Organic Light Emitting Diode (OLED). The first touch panel **140** can be implemented in capacitive type or resistive time to generate position information of a touch (hereinafter, assumed as a finger touch) to the control unit **100**. The second touch panel **150** is provided with an EMR sensor pad to detect a pen touch and generate a corresponding input signal to the control unit **100**. Here, the display unit **130**, touch panel **140**, and ERM panel **150** can be integrated into a signal device.

In the above-configured terminal, if a touch input is detected at a particular position of the image displayed on the screen of the terminal, the control unit **100** configures or defines the area near the pen touch location as a recognition region and recognizes character data or text(s) defined in the recognition region, then display the recognized character data along with the menu (hereinafter, referred to executable or action item) for performing a function corresponding to the character. Recognizing texts from a preview screen or a still image captured by a camera is well known in the art that can be performed in a variety of ways.

FIG. **2** is a flowchart illustrating the process of recognizing and processing text in an image displayed on the screen of the terminal according to an embodiment of the present invention. FIG. **3** is a diagram illustrating exemplary screen images displayed by the terminal operating in the text recognition mode according to an embodiment of the present invention.

Referring to FIGS. **2** and **3**, the control unit **100** controls the display unit **130** to display an image at step **211**. Note that the displayed image can be received in the terminal from an exterior source, such as another terminal, internet, cloud, server, etc. At this time, the image displayed by the display unit **130** can be an image including a picture and characters or only characters (e.g. document image). If the user makes a touch input or gesture by means of a pen on the image, the control unit **100** detects the pen contact by means of the second touch panel **150** at step **213** and checks the position of the pen contact detected by the second touch panel **150** to perform text recognition at step **215**. That is, if a user draws a line by means of the pen **311** as denoted by reference number **315** on the image as shown in the exemplary screen images **350** and **370** of FIG. **3**, the control unit **100** detects the pen gesture by means of the second touch panel **150** and configures the area around the pen drawing (pen drawing area) as a recognition area. Alternatively, the word displaced either above or below between the underlined **315** can be recognized according to the embodiment of the present invention. Next, the control unit **100** recognizes the characters in the recognition area and displays the recognized character(s) **321** and action item **323** in the form of a popup window as shown in the exemplary screen images **360** and **380** according to the analysis result at step **219**.

In FIG. **3**, the screen image **350** shows an exemplary case where the pen drawing is made onto a phone number in the image, and the screen image **370** shows an exemplary case where the pen drawing is made onto text of the image. In an

embodiment of the present invention, it is assumed that the text is classified into one of the linkage text with certain link information and normal text without link information. In this case, the linkage text with link information can be any of Uniform Resource Locator (URL), email, phone number, address, and Social Network Service (SNS) identity information. If such a linkage text is recognized, the control unit **100** is capable of displaying the action items (menu items) executable with the link information. Here, the action items of the linkage text can be summarized as shown in table 1.

TABLE 1

Link information	Action items
e-mail	send email, add to contact(view contact), share
phone	call, send message, add to contact(view contact), share
URL	open URL, add to book mark, share

In the case of the normal text, the control unit **100** is capable of displaying the action items **323** such as 'copy to clipboard', 'web search', 'share', 'dictionary', etc.

Thereafter, in the state of displaying the action items corresponding to the text at the recognition region configured in response to a pen touch, the control unit **100** serves the action corresponding to the selected action item at step **221**.

Meanwhile, the pen touch-based text recognition area configuration can be performed in various ways at steps **213** and **215**. That is, the control unit **100** detects the text selected by pen and performs the recognition in unit of word or line. FIGS. **4***a* and **4***b* are diagrams illustrating exemplary screen images for explaining configuration of the recognition area in response to the pen gesture input during the text recognition method according to an embodiment of the present invention.

Referring to FIG. **4***a*, the recognition area can be configured in response to the pen touch gesture of underlining a text as denoted by reference number **410**, drawing a closed curve as denoted by reference number **420**, or highlighting with the pen as denoted by reference number **430**. In the case of underlining the text, if a line is drawn between two text strings with short letter-spacing, the control unit **100** recognizes one or both of the text strings. In an embodiment of the present invention, it is assumed that the text string above the drawn line is recognized and processed.

Referring to FIG. **4***b*, in the case of configuring the recognition with the pen as shown in the screen image **440** (reference number **410** shows the exemplary case where the touch input is made by drawing a cross line on the text), the underline drawn by the pen may end in the middle of a sentence. In this case, the control unit **100** configures the recognition region such that the words on the underlined are included in the recognition region. Accordingly, if the pen touch input is made as shown in the screen image **440** of FIG. **4***b*, the control unit **100** configures the recognition area to recognize the text along with the display of the action items as shown in the screen image **450**.

FIG. **5** is a flowchart illustrating the pen touch-based text recognition method for a terminal operating in a preview mode according to an embodiment of the present invention. FIGS. **6***a* and **6***b* are diagrams illustrating exemplary screen images for explaining the text recognition procedure of FIG. **5**.

Referring to FIGS. **5**, **6***a*, and **6***b*, the control unit **100** is capable of activating the text recognition mode in the state that the terminal is operating in the preview mode or activating the camera to enter the preview mode in the state that the text recognition mode is configured. In this state, the control unit **100** controls the display unit **130** to display the preview image (live image) provided by the camera **160** at step **511**. The preview image provided by the camera **160** can be an image including picture and text, for example, a signboard picture or a document image including only text. If the user makes a pen touch on the preview image displayed by the display unit **130**, the control unit **100** detects the pen touch input by means of the second touch panel **150** at step **513** and captures the preview image as a still image at step **515**. Note that the preview image or still image can be received from an exterior source.

The reason for capturing the still image in this embodiment is because it is difficult to enter the pen touch input on the preview image itself due to the shake of the terminal. In order to provide a correct touch input without shake of the image, the control unit **100** captures the preview image as a still image, which is used to detect the pen touch input. Since it is difficult to make a correct pen touch input on the non-stationary preview image, the control unit **100** controls to capture the current screen image as a still image immediately upon detecting the pen touch input. As such, the display unit **130** displays the captured still image such that the user is capable of selecting the text on the still image by means of the pen without any shaking the image (e.g. in the state of holding the terminal by one hand or placing the terminal on a fixed object).

Accordingly, as shown in FIG. **6***a*, if a pen touch input is detected on the screen in the state that the preview image is displayed as denoted by reference number **610**, the control unit **100** captures the preview image as a still image as denoted by reference number **620** such that the user can make a pen touch input onto the still image.

If the pen touch input has completed, the control unit **100** configures the text recognition area in the image based on the position of the pen touch detected by means of the second touch panel **150** at step **517**. In the embodiment, the pen touch input can be made in the form of contact on or hovering above the screen as described earlier with reference to FIG. **4***a*.

Next, the control unit **100** recognizes the text within the text recognition area at step **519** and analyzes the recognized text and displays the text data and the corresponding action items in the form of a popup window according to the analysis result at step **521**. Here, the action items can be changed depending on whether the recognized text is the linkage text or the normal text and, in the case of the linkage text, the action items can be provided as summarized in table 1. If one of the action items is selected by the user, the control unit **100** executes the action corresponding to the selected action item.

FIG. **6***b* is a diagram illustrating the exemplary screen images for explaining the operation of the terminal in response to a hovering gesture input made by a pen according to an alternate embodiment of the present invention. If the pen approaches into a predetermined range of the display unit **130** as shown in the screen image **640** of FIG. **6***b*, the second touch panel **150** detects the approach of the pen. If the hovering gesture input is detected, the control unit **100** controls to capture the preview image as a still image such that the user can draw underline and make other gesture stably. Note capturing of a still image can be achieved using a predesigned activation button on the terminal or an activation button provided in the touch pen.

Once the still image is displayed, the control unit **100** is capable of configuring an area selected with a certain pen's

hovering gesture or underlined contact gesture as the text recognition area. The control unit **100** recognizes the text in the text recognition area and displays the recognized text data and the corresponding action items as shown in the screen image **660**.

FIG. **7** is a flowchart illustrating the text recognition method according to another embodiment of the present invention. FIGS. **8***a* and **8***b* are the diagrams illustrating exemplary screen images for explaining the text recognition procedure of FIG. **7**.

Referring to FIGS. **7**, **8***a*, and **8***b*, the control unit **100** controls the display unit **130** to display an image at step **711**. The image displayed at step **711** can be a still image captured by the camera **160** or received by communication unit **120**. The image can be an image including a picture and text or a document image including only text. If the user enters a request for recognizing text as denoted by reference numbers **810** of FIGS. **8***a* and **850** of FIG. **8***b* (get text), the control unit **100** detects the user request at step **713** and recognizes and displays all the texts in the image at step **715**. At this time, the text recognition can be executed in unit of word. Afterward, if a pen touch gesture is made at a position corresponding to the recognized text, the control unit **100** detects the pen touch by means of the second touch panel **150** at step **717** and configures the position of the pen touch as the text recognition area to select the text therein at step **719**. At this time, the pen touch can be a contact gesture or a hovering gesture. Afterward, the control unit **100** analyzes the selected text and displays the text data and action items corresponding to the text data according to the analysis result at step **721**. Here, the action items can be changed depending on whether the selected text is the linkage text or the normal text. In the case of the linkage text, the action items can be provided as summarized in table 1. If one of the action items is selected by the user, the control unit **100** executes the action corresponding to the selected action item at step **723**.

FIGS. **8***a* and **8***b* shows the exemplary screen images displayed in the procedure of FIG. **7**: FIG. **8***a* for the case of selecting a phone number and FIG. **8***b* for the case of selecting normal text.

Referring to FIG. **8***a*, if the text recognition mode is activated (get text) as shown in the screen image **810**, the control unit **100** performs steps **713** and **715** to recognize all text items in the screen image. Recognizing texts using a camera or from a preview screen is well known in the art that can be performed in a variety of ways. At this time, a number of recognized text items can be displayed a specific region (e.g. top region) on the display unit **130**. If the user selects one of the text items with a pen touch gesture as shown in the screen image **820**, the control unit **100** performs steps **719** and **721** to display the text data of the selected text item and a number of action/executable items corresponding to the text data as shown in the screen image **830**, and executes, if the user select one of the action items, the action corresponding to the selected action item.

Referring to FIG. **8***b*, if the text recognition mode is activated (get text) as shown in the screen image **850**, the control unit **100** performs steps **713** and **715** to recognize all text items in the screen image. At this time, a number of recognized text items can be displayed a specific region (e.g. top region) on the screen of the display unit **130**. If the user selects one of the text items or all of the recognized texts with a pen touch gesture as shown in the screen image **860**, the control unit **100** performs steps **719** and **721** to display the text data of the selected text item as shown in the screen image **870**. Alternatively, a list of action/executable items corresponding to the text data can be displayed for further selection by the user.

For selection, the user is capable of selecting plural text items by moving the pen in a diagonal direction as shown in the screen image **860** such that the text data of the plural selected text items are displayed as shown in the screen image **870**. In this case, the action items can be displayed at specific position, for example, on the upper region of the screen in the screen image **870**. If the user selects one of the action items (web search item in case of screen image **870**), the control unit **100** executes the action corresponding to the selected action item as shown in the screen image **880**.

The above-described methods according to the present invention can be implemented in hardware, firmware or via the execution of software or computer code that can be stored in a recording medium such as a CD ROM, an RAM, a floppy disk, a hard disk, or a magneto-optical disk or computer code downloaded over a network originally stored on a remote recording medium or a non-transitory machine readable medium and to be stored on a local recording medium, so that the methods described herein can be rendered in such software that is stored on the recording medium using a general purpose computer, or a special processor or in programmable or dedicated hardware, such as an ASIC or FPGA. As would be understood in the art, the computer, the processor, microprocessor controller or the programmable hardware include memory components, e.g., RAM, ROM, Flash, etc. that may store or receive software or computer code that when accessed and executed by the computer, processor or hardware implement the processing methods described herein. In addition, it would be recognized that when a general purpose computer accesses code for implementing the processing shown herein, the execution of the code transforms the general purpose computer into a special purpose computer for executing the processing shown herein.

As is apparent from the foregoing, the present invention has an advantage in that a simple pen gesture on a screen, which displays an image from a camera or another source, enables a user to activate a number of functions related to a selected text responsive to the pen gesture on the screen. The portable terminal of the present invention is capable of capturing a preview image provided by a camera as a still image in response to a pen touch gesture and configuring a touch recognition area in response to a subsequent pen touch gesture so as to improve accuracy of pen touch-based text recognition area configuration.

The previous description of the preferred embodiments is provided to enable any person skilled in the art to make or use the present invention. Thus, the specification and drawings are to be regarded in an illustrative rather than a restrictive sense in order to help understand the present invention. It is obvious to those skilled in the art that various modifications and changes can be made thereto without departing from the broader spirit and scope of the invention.

What is claimed is:

1. A text recognition method of a terminal, the method comprising:

displaying a preview image on a screen of the terminal;

capturing the preview image as a still image in response to detecting a hover gesture caused by an input device approaching the screen;

displaying the captured still image;

configuring a recognition area on the still image in response to detecting contact of the input device to the screen, the recognition area based on a location of the detected contact;

recognizing at least one text in the recognition area; and

displaying the recognized text and a list of selectable action items corresponding to the text.

2. The method of claim **1**, further comprising executing, when one of the action items is selected, an action corresponding to the selected action item.

3. The method of claim **1**, wherein the recognition area is defined by a drawing a line on, around or under the at least one text.

4. The method of claim **3**, wherein configuring the recognition area comprises configuring, when the line is drawn between an upper and lower text strings, the upper text string above the line as a part of the recognition area.

5. The method of claim **3**, wherein configuring the recognition area comprises configuring, when the line is drawn at bottom of at least one letter of a word, the word as a part of the recognition area.

6. A terminal comprising:

a camera providing a preview image;

a touch panel detecting an input gesture;

a display unit displaying the preview image; and

a control unit configured to:

control the camera to capture the preview image as a still image in response to the detecting a hover gesture caused by an input device approaching the touch panel;

control the display unit to display the captured still image;

configure a recognition area on the still image in response to detecting contact of the input device to the touch panel, the recognition area based on a location of the contact;

recognize at least one text in the recognition area; and

control the display unit to display the recognized text and a list of selectable action items corresponding to the text.

7. The terminal of claim **6**, wherein the recognition area is defined by a drawing a line on, around or under the at least one text.

8. The terminal of claim **7**, wherein the control unit configures, when the line is drawn between an upper and lower text strings, the upper text string above the line as a part of the recognition area.

9. The terminal of claim **7**, wherein the control unit configures, when the line is drawn at a bottom of at least one letter of a word, the word as a part of the recognition area.

10. A text recognition method of a terminal, the method comprising:

displaying a preview image on a screen of the terminal;

in response to detecting a hover input of an input device, capturing the preview image as a still image and displaying the captured still image;

recognizing by a processor all text in the captured still image in response to detecting a contact setting a text recognition mode, and removing the captured still image to display a list of recognized texts from the captured still image; and

in response to detecting an input selecting a text from the displayed list, analyzing the selected text to display textual data of the selected text and a list of action items corresponding to a type of the selected text.

11. The method of claim **10**, wherein:

when the type is e-mail, the action items comprise at least two of sending an e-mail, adding to a contact list, and sharing textual data;

when the type is a phone number, the action items comprise at least two of calling the phone number, sending a message to the phone number, adding the phone number to the contact list, and sharing the phone number; and

when the type is a uniform resource locator (URL), the action items comprise at least two of opening the URL in a browser application, adding the URL to a bookmark list, and sharing the URL.

* * * * *